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ABSTRACT

The continued growth of the data processing industry has been accompanied by a need for personnel trained to operate, program, and utilize electronic data processing equipment. Education must be provided to those who seek to enter this industry. Successful programs have been developed at the secondary school level in Massachusetts. This article outlines the projected growth of the computer industry and corresponding growth in electronic data processing employment prospects. The data processing curriculum for a successful high school program with complete course outline is included. (Author/KP)

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NEED FOR DATA PROCESSING

VOCATIONAL TRAINING

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February 11, 1977

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MEDPA NEWSLETTER, 197 Loring Avenue, Salem, MA. 01970

NEED FOR ELECTRONIC DATA PROCESSING VOCATIONAL TRAINING

By James J. Nolan

The electronic data processing industry is demonstrating constant and significant growth. This growth has created a demand for persons skilled in using, operating, and programming this tool of business. Currently, there are educational programs in some Massachusetts secondary schools that teach data processing and successfully place their students in this field. It is paramount that these programs be expanded to include all secondary schools in Massachusetts.

An expansion of data processing educational programs will provide the students of tomorrow with an opportunity to gain a skill in a field where a shortage of trained employees currently exists. Skills in data processing will be even more marketable in the 1980's when the computer industry is expected to double. The foundation to satisfy the forthcoming requirement must be laid immediately. Programs must be established and funding must be provided to ensure that high school graduates of the immediate future are equipped to enter tomorrow's world of work.

Today's high school student will be only forty years old in the year 2000, when, as many predict, the computer industry will be the largest industry in the United States. He must be prepared now!

Computer Industry to Double by 1980

According to estimates and forecasts by International Data Corporation, as cited in FORTUNE Magazine, June 1976, "From $14 billion level when the 1970's began, the revenues of U.S. suppliers of computers this year will sweep past $30 billion and hit the $60 billion mark by yearend 1980." FORTUNE also noted that the number of computers in use in 1976 was 400,000. By 1980, they project that the number of computers will approximate one million. IDC "expects several years of stable uniform growth in the computer marketplace."

As the number of computers soars toward the one million mark by 1980 most companies with $500,000 in sales will be candidates for a computer service. Presently, some 400,000 organizations in the U.S. use no computer or data processing service, but are as large as some that do. This is the present market for growth. As the cost of computers continues to decline, the market will increase substantially.

Electronic Data Processing Employment Prospects Bright

A 1975 report produced by the American Federation of Information Processing Societies, Inc. and the Council of Better Business Bureaus, Inc., projected that the 1975 work force in electonic data processing of approximately one million persons is expected to double by 1980. Professional and clerical employees were included in the projection. According to the report, the following job titles are open to qualified high school graduates: key punching, computer operator, and programmer.

In a 1976 computer industry forecast, it was stated that overall spending on data processing personnel salaries will increase as users expand their in-house staffs. Users may give smaller raises but more paychecks. People in the highest demand will be programmers and analysts. The growing demand for computer operators was also cited.

A 1973 national survey of programmers revealed that 21.4% of programmers who program business applications had no formal education after graduation from high school. The survey was part of an extensive report on Computer Programmer Job Analysis prepared by the American Federation of Information Processing Societies, Inc. According to a recent report

from the U.S. Department of Labor, Bureau of Labor Statistics (BLS), employment prospects in the data processing field will continue to grow through the 1980's. Job openings in the computer field will show an overall growth of 30.4% in the next decade, the report predicted.

According to the report, continuing growth in employment demand can be attributed to the following four major factors:

- Growth in the number and types of computers and peripheral equipment manufactured.
- An increase in the number and types of organizations using computers or computer services.
- Continued development of new computer used.
- Increasing emphasis on computers as tools for management information.

Massachusetts Has Programmer Shortage

According to "New England Occupational Projections to 1980" published by the U.S. Department of Labor, "Among white collar workers, employment in the professional and technical occupational category is projected to increase by approximately 160,000 in the ten year period. The total growth in this group will in all likelihood be greater than in any other major category in New England. By 1980 approximately 18 percent of the region's employees will be professional and

technical workers compared with 16 percent in the nation as a whole....the need to operate and maintain a growing number of computers will all require trained professional and technical workers....Many clerical occupations will continue to be eliminated by the use of computers as they assume the routine and repetitive operations formerly done manually by payroll, accounting, inventory, and billing clerks. On the other hand, the wider use of electronic data processing requires a greater number of operators and related workers to prepare material for the computer."

Furthermore, the document "Area Manpower Review" published by the Massachusetts Division of Employment Security cited as "hard to fill" the occupation "Computer Programmer". The reason given in the report is that there is a shortage of applicants in this field. The report was dated October 1975.

Limited Data Processing Training Has Proven Its Effectiveness

Successful training programs are presently conducted in some vocational schools and are currently funded under CH 74. Key punch training and computer programming are being taught in Massachusetts Vocational Schools. Graduates of these programs are finding employment in Massachusetts.

Some Massachusetts public schools have demonstrated over the past few years that data processing training in comprehansive high schools provides employment in computer data entry, computer operations, and junior computer programming. Several comprehensive high schools have programs equal to and, in some cases, more substantial than programs in the vocational schools. Although there is no vocational funding for these programs, extensive curriculums have been established. That at one comprehensive high school in enclosed as Addendum A. Graduates from comprehensive high schools have successfully found employment in the data processing field in recent years.

A partial listing of firms that have hired Massachusetts high school graduates from both vocational and comprehensive schools for their data processing departments is enclosed in Addendum B.

The General Public Favors Data Processing Training In High School

A 1971 survey conducted by Lieberman Research Inc. and published by TIME Magazine and AFIPS, Inc. revealed that the general public felt positive about persons entering the computer field. Of those surveyed in this nationwide survey, 76% were in favor of a young person selecting the computer field as a career vs. 5% who would be opposed. The survey also revealed that 49% of persons, interviewed at random, had worked at jobs requiring contact with a computer. Thirty-three percent of those that had worked with a computer had received no formal training after graduating from high school.

High School Vocational Training for the Computer Field Must be Expanded Now

Any high school student, who would like to, ought to try his hand at key punching, computer operations, and computer programming. Massachusetts schools should have the equipment and staff to offer training for all entry jobs, ie. tape/disk drives, communications devices, keytape or key disk. They should also have the capacity for receiving training in all major languages. In fact, no student should come out of high school without some degree of computer literacy.

This Report Has Been Prepared For The Massachusetts Educational Data Processing Association By James J. Nolan

MEDPA is an organization designed to serve the educational community in the area of electronic data processing. The organization is incorporated under the laws of the Commonwealth of Massachusetts. Over 220 school systems in Massachusetts participate in the annual Education/Data Processing Survey published by MEDPA. Over 80 Massachusetts schools are active members of this eleven year old organization.

James J. Nolan, President of MEDPA, is the Coordinator of Data Processing for the Hull Public Schools. Mr. Nolan holds a B.S. in Physics from Holy Cross College and an M.B.A. from Boston College. He has performed consulting work for the Massachusetts Department of Education, The New England School Development Council and several public school systems in Massachusetts.

ADDENDUM A

DATA PROCESSING CURRICULUM

HULL HIGH SCHOOL

INTRODUCTION TO DATA PROCESSING

45 - 45 minute classes - Freshman

This course is one quarter of a course entitled "Introduction to Business". The remainder of the course includes typewriting, bookkeeping, and distribution.

Upon completion of "Introduction to Data Processing", the student will be able to:

1. Describe the function of the punched card.
2. Describe the coding of a punched card.
3. Layout fields on a punched card.
4. Describe the function and operation of the 029 key punch.
5. Operate the 029 key punch.
6. Describe the function of a digital computer, its input devices, and its output devices.

FUNDAMENTAL PRINCIPLES OF DATA PROCESSING

180 - 45 minute classes - Juniors

Upon completion of this course the student will be able to:

1. Define the punch card principle.
2. Describe the coding on an 80 column punch card.
3. Layout fields on a punch card.
4. Describe the function of and operate the following equipment:
   - A. 082 Sorter
   - B. 514 Mark Sense Reproducer
   - C. 029 Key Punch
   - D. 129 Buffered Key Punch
   - E. IBM 1130 Computer
     - (1) 1442 Card Reader
     - (2) 1131 Central Processing Unit
     - (3) 1132 Printer
5. Write a program in BASIC which will read cards, perform arithmetic calculations, and print an answer.
6. Write a program in RPG which will read cards, perform arithmetic calculations, and print a report.

7. Run BASIC and RPG programs on the IBM 1130 Computer.
8. Test and debug BASIC and RPG programs on the IBM 1130 Computer
9. Document programs written in BASIC and RPG.

COMPUTER PROGRAMMING/SYSTEMS DESIGN

180 - 90 minute classes - Seniors

This course assumes one has successfully completed Fundamentals of Data Processing or the equivalent.

Upon completion, the student will be able to:

1. Operate the following data processing equipment:
   - A. IBM 1130 Computer
     - (1) 1131 Central Processing Unit
     - (2) 1442 Card Read Punch
     - (3) 1132 Printer
     - (4) Change disks
     - (5) Change paper
     - (6) Clear card jams
     - (7) Prepare carriage control tape
     - (8) Interpret error conditions displayed on the console
   - B. 082 Sorter
     - (1) Sorting - alphabetic and numeric
     - (2) Counting
     - (3) Selecting
     - (4) Block sorting
   - C. 514 Mark Sense Reproducer
     - (1) Reproducing
     - (2) Gang Punching
     - (3) Mark Sense Reading
   - D. 029 Card Punch
     - (1) Key punching
     - (2) Interpreting
     - (3) Program operation
   - E. 129 Card Punch
     - (1) Key punching
     - (2) Verifying
2. Write RPG programs using the following RPG features:
   - A. Read cards and write a report
   - B. Arithmetic Calculations
   - C. Compare
   - D. Control Levels
   - E. Print Heading
   - F. Group Printing
   - G. Processing Multiple Records
   - H. Process Tables
   - I. Use Matching Records
   - J. Load, list, and update an indexed sequential disk file.

3. Write COBOL programs using the following COBOL features:
   A. Read cards and print a report
   B. Perform arithmetic caluclations
   C. Compute
   D. Final Totals
   E. Compare
   F. Conditions
   G. Heading
   H. Total Logic
   I. Table Lookup
4. Write a BASIC program that reads cards, computes, and prints an answer.
5. Write a FORTRAN program that reads cards, computes, and prints an answer.
6. Design a system that creates a disk file from cards, updates the file from cards, adds records to the file, and prints a report from the file.
7. Document a system which uses cards and disk files to generate a repor
8. Describe the internal functions of a digital computer showing the relationship between instructions and addresses, machine language and source language.
9. Describe the function of a monitor, supervisor, compiler and various areas on a disk.
10. Displays general knowledge about the many uses of electronic data processing today and about projected utilization of computers.
11. Write and speak intelligently about the state of the art of the field of data processing.

ADDENDUM B

ANDERSON POWER PRODUCTS
AVIS
BOSTON CAMPING
BOSTON COLLEGE D.P. DEPT.
BOSTON GEAR WORKS - QUINCY
BROCKTON COURT HOUSE
BROCKTON ENTERPRISE
BROCKTON HOSPITAL
BROCKTON PUBLIC MARKETS
BROCKTON SCHOOL SYSTEM
BROCKTON BAY STATE GAS
CARDINAL CUSHING HOSPITAL
CITY OF LYNN COMM. DEV.
COLLEGE TOWN
COMPUTED INVENTORY PARTS SERVICE
CRAMER ELECTRONICS
DEPT. HEALTH, EDUCATION, WELFARE
DIGITRONICS CORPORATION
EATON SHOE
EMERSON & CUMMINGS
FACTORY MUTUAL INSURANCE CO.
FAIRFIELD OPTICAL
FEDERAL RESERVE BANK OF BOSTON
FERNANDES SUPER MARKETS
FIRST NATIONAL BANK - BOSTON
FOXBORO COMPANY
FOXMOOR CASUALS
FRANKLIN SPORTWEAR
G.A. CALDWELL CO.
GARLAND CORP.
HILLS DEPT. STORES
HULL HIGH SCHOOL D.P. DEPT.
JAMES FERRERA & SONS INC.
JOHN HANCOCK INSURANCE
KINGSIZE
KNAPP SHOES
MAMOUTH MART STORES
M.B. CAFF & SONS INC.
MELDISCO SHOE
MICHAEL JAYE SPORTSWARE
MISTER LUMBER
MORSE SHOE COMPANY
NEW ENGLAND MERCHANTS BANK-BOS.
NEW ENGLAND TELEPHONE&TELEGRAPH
NORFOLK DATA
NORTHROP ELECTRONICS
PARK MEDICAL
PAUL BARROW CO.
PLYMOUTH HOME NATIONAL BANK
PLYMOUTH ROCK TRUCKING
PLYMOUTH RUBBER
PRIME COMPUTER
PRUDENTIAL INSURANCE CO.
RADIO SHACK CORP. - BRAINTREE
RUST CRAFT
SALEM STATE COLLEGE D.P. DEPT.
SAMPSON CORDAGE
SEARS ROEBUCK
SMITH VALVE
SOUTHEASTERN REGIONAL SCHOOL
SOUTH SHORE HOSPITAL
SOUTH SHORE PUBLISHING CO.-SCITUATE
STATE STREET BANK - QUINCY
STOP & SHOP
SYLVANIA - NEEDHAM
TRAVELLERS INSURANCE
U.S. AIR FORCE
U.S. ARMY - PENTAGON
U.S. DEPT COMMERCE-GOV'T CNTR.-BOS.
U.S. NAVY
WANG LABORATORIES-TEWKSBURY
WARREN BROS. OIL
WHEATON COLLEGE
ZAYRE-FRAMINGHAM

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